ICE SLOTTING OILSPILL EXERCISE

Prepared by:

PRAIRIE REGIONAL OIL SPILL CONTAINMENT AND RECOVERY ADVISORY COMMITTEE

RESEARCH AND DEVELOPMENT SUBCOMMITTEE

NORTH SASKATCHEWAN RIVER

DEVON, ALBERTA

MARCH 3, 1988

CANADIAN PETROLEUM ASSOCIATION

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Introduction:

On March 3, 1988 the Area "I" (Redwater) and Area "J" (Devon) Oilspill Co-operatives in association with the Research and Development Committee of PROSCARAC held a joint ice slotting exercise on the North Saskatchewan River at Devon, Alberta (Control Point #104). The On-scene Commander was Marty Van Soest from Esso Resources.

Objectives:

The objectives of the exercise were:

A) to supply Co-op personnel with theoretical training in the recovery of oil under ice.

B) to evaluate actual ice-slotting techniques.

C) to evaluate our safety procedures on ice during an exercise and precautions for actual spill situations.

D) to evaluate the control point for situations other than summer.

E) to evaluate and make recommendations on the equipment that is in the OSCAR winter trailer.

F) to determine the type of equipment to manpower requirements in actual spill situations.

G) to evaluate different methods of keeping the slots open overnight in cold temperatures.

H) to determine optimum slot angles and configurations of slots. eg. J on end of slot to maximize velocity.

I) to evaluate any equipment available to monitor flow rates under ice.

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Discussion:

The exercise was divided into two parts. The morning consisted of a classroom session and during the afternoon the actual exercise was conducted.

Classroom Session:

The morning session consisted of three presentations. Wayne Wiebe from PITS discussed the theory of spill recovery under ice including the basic techniques particularily during adverse conditions. As usual his talk was very informative and thorough. The second presentation was done by Dave Fennel, from Esso Resources on safety concerns and also his observations from ice slotting exercises held in Norman Wells. This different perspective was very much appreciated. The third presentation, by a representative of the Devon Ambulance group, was on hypothermia and its effects. Again there was much interest in this topic.

The classroom session concluded with the selection of crews for the work on the ice.

Ice Slotting:

After lunch, the group moved to Control Point #104 on the North Saskatchewan River for the actual demonstration. A couple of items that made this exercise unique were the use of underwater divers to provide verbal and photographic record of under ice activity and the majority of the ice slotting and site preparation had been completed the day before.

To alleviate the crowding at the work site, several areas on the river were utilized to demonstrate various aspects of ice slotting. In one area, a small slot was prepared in exactly the same manner as the main slot to give everyone and appreciation of how the ice blocks were

removed. In another area, three slots had been prepared the night before. Two slots had been covered with different insulating materials and the third was left open to the atmosphere. This was done to test the insulating effectiveness of different materials to eliminate the need to recut slots after a particularily cold night.

The main area with the large "J" slot was used to test the specialized ice equipment. The Pedco heat traced, ice skimmer was used to recover dyed canola oil that was released upstream of the slot.

Throughout the entire exercise, underwater divers were assessing and videotaping the sequence of events and monitoring what was actually occurring below the ice.

Conclusions:

Generally, all the objectives were met and safety was a high priority for all participants. By utilizing several areas for demonstration, all participants (147 registered) were able to view the entire operation without endangering anyone by having to crowd around one slot.

The following specific conclusions were made:

- The ditch witch machine with carbide teeth worked well but the rate was quite slow (much less than 75 feet in 20 minutes as seen in previous trials).
- Because of the thickness of the ice (30 - 36 inches), the small push type ditch witch was not used. The supplier felt it was too light and didn't want to bend the boom.
- A curved slot is much more difficult to cut than a straight line slot.
- Due to the fact that the blocks were cut into relatively small segments, it took an extended amount of time to clear the slot.
- The backhoe and "T" bar method of ice block removal works very well and could have lifted much larger blocks.
- The easiest and most effective way of clearing the slot is to push the blocks under and allow the current to carry them away.

- There was some difficulty in levelling and adjusting the Pedco Ice Skimmer.
- The Skim-Pak will work in ice conditions, although one of the pumps was not functioning. A vacuum truck provided suction.
- In the test ice slots, the one that was left uncovered (also with blocks still in place) froze over night but due to the relatively warm temperature, the ice cover was not very thick (1" - $1^1/_2$").
- The slot covered with blue insulation and snow did not freeze over but there was a large accumulation of slush.
- The slot covered with plywood and snow also had a good deal of slush in it but it did not freeze over.
- The slush in the slots was probably not due to the ambient temperatures but rather from upstream activities in the main test area.
- The covers did keep the water from freezing and the temperature recorders indicated that the air temperature was higher in the slots which were covered than that of the ambient recorder. Ambient temperature was -5°C and the covered slots were -1°C.
- The main slot also froze over night and this ice cover had to be removed before the exercise.
- A flow meter was used to determine current speeds and some problems were encountered due to the fact that the speed in the main slot was much slower than the speed recorded in the divers' opening which was only seventy-five feet upstream. The readings are as follows:

Flow in divers opening just below ice.	1.93 ft/sec	1.32 miles/hour
Flow in divers opening 1 foot below ice.	1.93 ft/sec	1.32 miles/hour
Flow in divers opening 1 foot off bottom.	1.41 ft/sec	.98 miles/hour
Flow in divers opening middle of water.	1.45 ft/sec	.99 miles/hour
Flow in ice slot.	.7 ft/sec	.48 miles/hour.

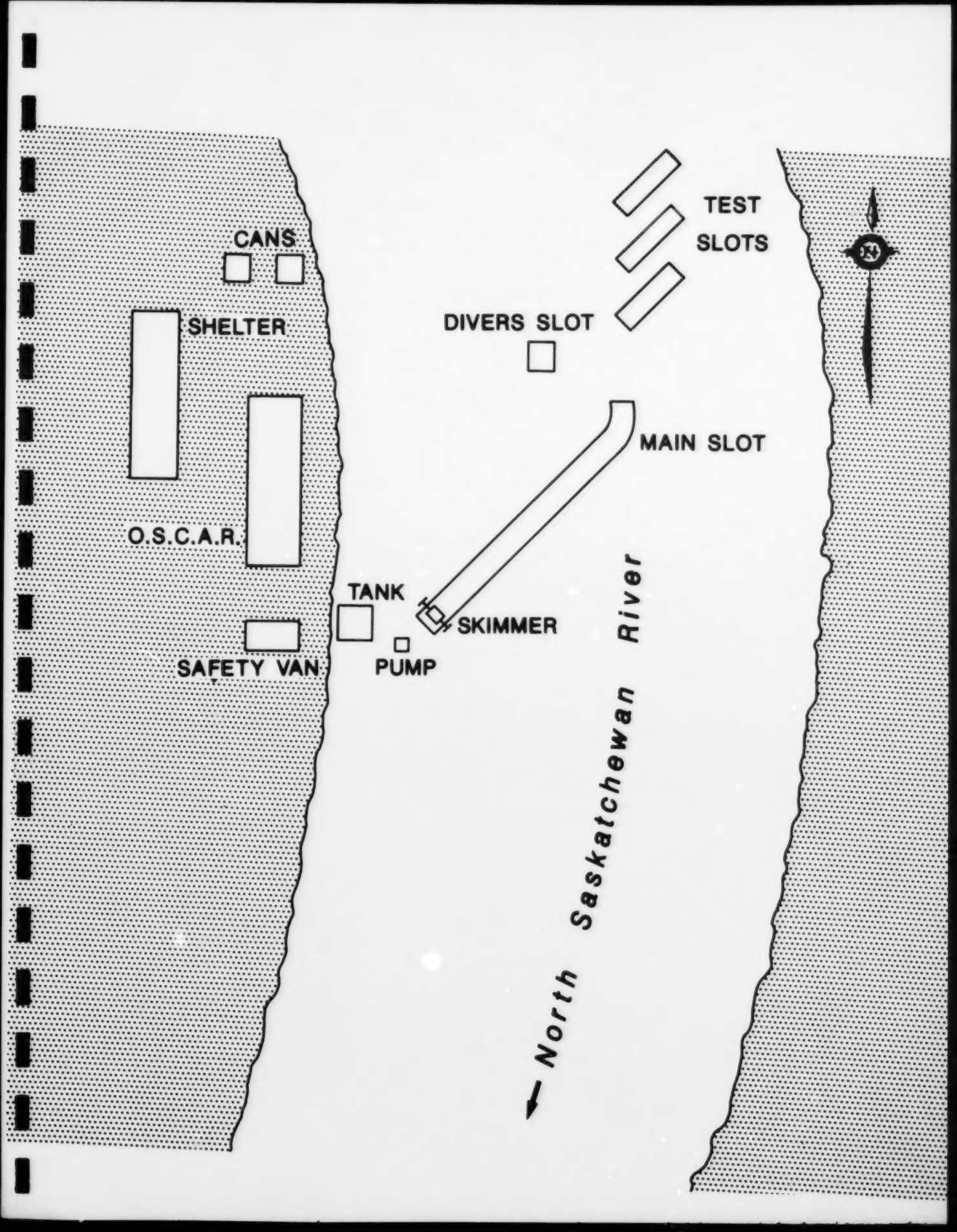
- From divers' observations, the flow seemed to change under the ice and that slush generated during cutting procedures was hung up on the underside of the ice.
- The divers did not experience any difficulties, even though they were working in very shallow water (since the ice was so thick).
- The slow moving slush trapped under the ice was preventing the canola oil from moving into the slot and thus reduced the amount that was recovered.
- Installing a "J" in the leading end of the slot increased the velocity in the slot and therefore speeds oil recovery.

Recommendations:

For future ice exercises, for which there is a significant need as concluded from the interest shown, the following recommendations are offered in no particular order of priority:

- To cut down on preparation time, cut out blocks as big as the backhoe can handle.
- When preparing blocks for removal, cut one side of the slot, drill holes for the "T" bar, and then cut the other side of slot. This will make the drilling operation more stable and will ensure that the hole for lifting is centered.
- For exercise purposes the blocks should be pulled (so they can be replaced to eliminate the hazard after everyone has departed) but in an actual spill situation, they should be pushed under so the current can remove them. Always make sure there is enough water depth before submerging the blocks.
- Use flow indicators through test holes in the ice to best optimize the location of the slot.
- Modifications should be made to the winter skimmers to allow for proper levelling.
- For an exercise, do as much work as possible on the ice beforehand so observers do not become bored waiting for preparation of the slot, installation of snow fence, erection of warning signs, etc. Make sure to construct enough slot during the exercise so that everyone has the opportunity to become familiar with the technique. A twenty foot section is probably sufficient.

- Local suppliers of winter equipment should be identified in each oilspill co-operative area for quick reference.
- More than one safety man should be on site during an exercise.
- The inventory for the CPA's Winter OSCAR trailer should be evaluated to include more equipment such as life jackets, boots, ice cleats, safety belts, another power auger, spare blades, etc.
- Proper boot guards should be provided for personnel using power saws.
- Test holes should be drilled with heavy equipment that has an auger attachment.
- The ditch witch machine should be used to cut slots as it is safer and faster.
- Different types of insulating materials should be tested under more extreme weather conditions to test for their effectiveness in keeping the slot from freezing.
- Divers should be utilized at future exercises to provide valuable underwater observations.
- Different configurations of slots should be investigated to determine the most effective pattern for collection of the oil.
- There is a need to develop an identification system (armbands, colored hardhats, etc.) for key personnel on the work site.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MAIN SLOT
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